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The Effect of Energy Price Increases on Industrial Prices and General Price Level : A Comparative-Static Analysis for Selected EU Countries and Turkey within the Open-Static Leontief Model

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ABSTRACT

Energy is one of the most important intermediate inputs used in the production of almost all goods and services. Instability in energy prices and/or disruption in energy supply definitely have negative consequences for output growth and general price stability. This study aims to calculate and compare the effects of energy price increases on industrial prices and general price level for selected 4 EU countries and Turkey within the static open Input-Output model. We will assume that, just like labor and capital, energy is a basic input and energy price is exogenous to the industrial price formation. Under this assumption, we will calculate the effect on the industrial prices of a unit increase in energy price by using static open I/O price formation equation. The analysis is comparative-static in nature, simply because the prices of all other basic inputs (e.g., wage rate) and technology are assumed to remain constant. Once the industrial price increases resulting from an increase in energy price is calculated by using Leontief inverse matrix end energy intensity vector, the increase in general price level can be easily calculated as a weighted average of industrial price increases. Selected EU countries are Germany, the Netherlands, Portugal, and Hungary. Just like Turkey, these four countries also depend on energy imports at varying degrees. Germany and the Netherlands are old and relatively big EU members. Portugal is, on the other hand, old but mid-sized country. Hungary is new member representing mid-sized and small country respectively.

Keywords: Energy Price, General Prices, Input-Output Analysis, EU, Turkey,
JEL - Codes: E31 Q40 D57

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1. INTRODUCTION

Energy, as an input in production, has no close substitutes and account for a significant part of the input costs. As such, production costs, product prices and competitive power are affected directly by changes in energy prices. Furthermore, many of the countries have limited domestic energy resources. Due to the risks of energy shortages, these kinds of countries are highly dependent on energy imports. Hence, instability in energy prices and/or distortion in energy supply expose the importance of national and international energy policies which can affect the level of output growth and general price stability.

In this context; the objective of this study is to calculate and compare the effects of energy price changes on industrial prices and general price level for selected 4 EU countries and Turkey within the static open Input-Output model. Selected EU countries are Germany, the Netherlands, Portugal, and Hungary.

The second section of the paper presents brief information on EU's common energy policy and also Turkey's energy policy in the adjustment process with EU. The third part of paper describes the methodology and features the model used for the analysis. The last section is devoted to an evaluation of the results and conclusion.

2. ENERGY SITUATION AND POLICIES IN THE EU AND TURKEY

Table 1 provides data about primary energy consumption by fuel for the world, the EU-25 and five countries to be analyzed in this study. As of 2005 World primary energy consumption was slightly above 10537 million tonnes oil equivalent. Almost 88 percent of the primary energy was provided by fossil fuels (36.4 % by Oil, 27.8 % by Coal, and 23.5 % by Natural Gas), whereas Nuclear energy and Hydro Electric amounted only 12.3 percent of the total consumption.

The total primary energy consumption of the EU was 1715 million tones oil equivalent in 2005. The Union is a major consumer of oil and natural gas. During 2005, the composition of energy consumption of EU-25 was 40.8 % Oil, 24.7 % Natural Gas, 17.4 % Coal, 12.9% Nuclear Energy, and 4.1 % Hydro Electric. Germany accounts for almost 20 % of total energy consumption of the EU by 324 million tonnes. Oil is the nost important type of primary energy in all selected countries, except for Hungary which depends more on natural gas. Poryugal and Turkey do not use nuclear energy, whereas Hungary and the Netherlands' hydro electric use is negligible. The relative share of hydro electric energy is highest in Turkey with a 10 percent share in total use.

Table 1 - Primary Energy Consumption by Fuel: 2005 (Million tonnes oil equivalent)*

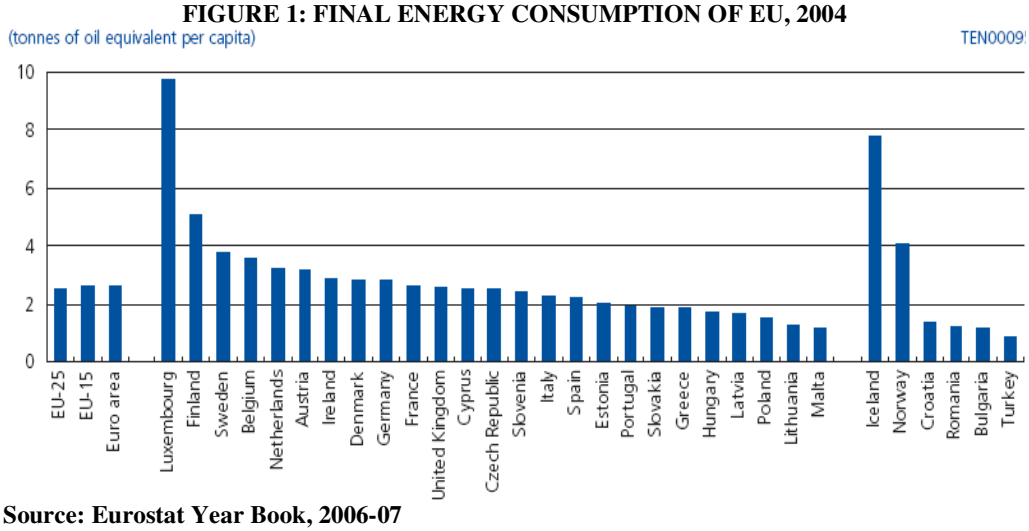
	Oil	Natural Gas	Coal	Nuclear Energy	Hydro electric	Total
Germany	121.5	77.3	82.1	36.9	6.3	324.0
Hungary	7.0	12.1	2.7	3.1	-	24.9
Netherlands	49.6	35.5	8.7	0.9	-	94.7
Portugal	15.3	2.7	3.8	-	1.1	23.0
Turkey	30.0	24.6	26.1	-	9.0	89.7
EU-25	700.4	424.1	299.0	220.9	70.8	1715.1
TOTAL WORLD	**3836.8**	**2474.7**	**2929.8**	**627.2**	**668.7**	**10537.1**

* Primary energy comprises commercially traded fuels only.

Source: http://www.bp.com**,** Statistical Review of World Energy, 2006

Energy consumption in EU countries is very intensive as reflected by high per capita energy consumption figures. Turkey's energy consumption per capita is significantly low compared to the EU-25 and EU Area per capita figures. Among the five countries analyzed in this study, per capita energy consumption figure is above the EU-25 average in Netherlands and Germany, whereas it is below the EU-25 average in Portugal, Hungary and Turkey (Figure 1).

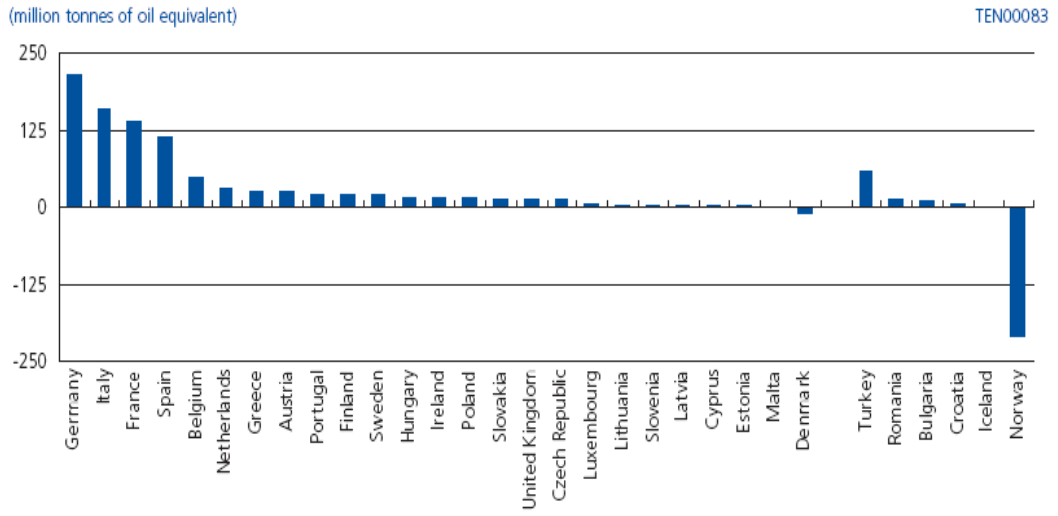
FIGURE 1: FINAL ENERGY CONSUMPTION OF EU, 2004



Source: Eurostat Year Book, 2006-07

The largest energy importers are usually the largest Member States. Germany is the largest net importer within the Union. As a candidate country net energy imports of Turkey is higher than many of the member states. Other three selected members in this study have lower net import values than Germany and Turkey (Figure 2).

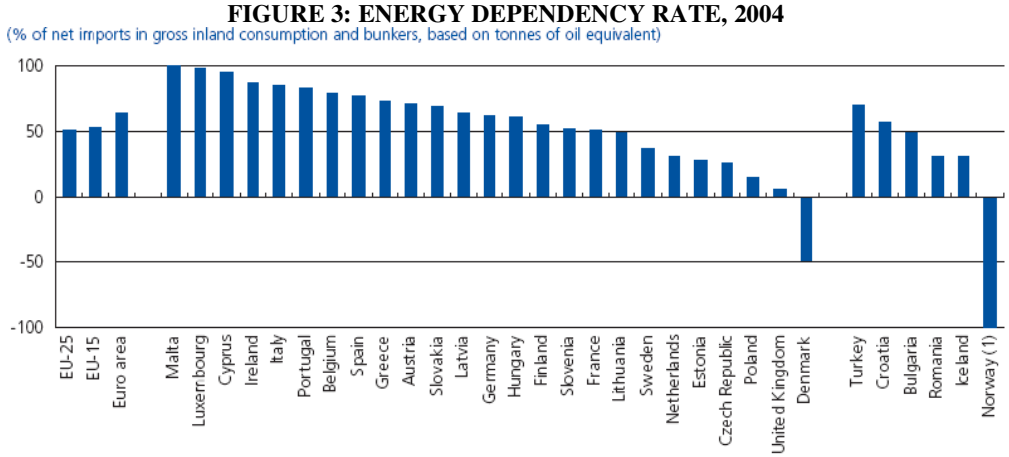
FIGURE 2: NET IMPORTS OF ENERGY, 2004



Source: Eurostat Year Book, 2006-07

EU-25 is dependent for almost 51% of its energy on imports from non-member countries. Energy dependency ratios are highest for petroleum. Within the selected countries, the energy dependency rates of Portugal and Turkey are higher than others. Although net import of the Netherlands is one of the highest, its dependency rate is the lowest (Figure 3).

FIGURE 3: ENERGY DEPENDENCY RATE, 2004



Source: Eurostat Year Book, 2006-07

2.1. COMMON ENERGY POLICY OF EU

In order to be more effective in global markets, European Union seriously seek to develop energy policies. At the beginning, EU countries aimed to have more competitive power in global markets with their national policies. However individual national policies were not sufficient to struggle with tough global competition, so that EU members decided to create a common policy and carry out this policy within the borders of the European Union.

The main objective of EU common energy policy is to provide cheaper, high quality and uninterruptible energy to the consumers. From this point of view, the policies depend on some principles that support each other: Accomplishing a well functioning internal energy market, providing supply security, and environment friendly energy.

The evolution of the EU is closely linked to energy problems of the members. After the World War II, the responsibilities of energy policy in the EU were allocated among three communities. European Coal and Steel Community (ECSC) took responsibilities of coal, the European Atomic Energy Community (EAEC) for nuclear power and the European Community (EC) for oil, gas and electricity. However, the members of EU were not sufficient self sufficient in energy production and they were highly dependent on other countries, especially the Middle East. Despite dependency, member states did not concentrate on safe use and development of domestic energy, because of availability of cheap imported energy resources. During fifties and sixties as the economies grow, limited domestic energy resources and dependency on foreign sources became a crucial problem. Moreover, the oil price shocks in the seventies caused crisis, instability and high unemployment. The member countries understood that national policies were not sufficient and a common policy was necessary.

In the nineties, EU's energy policies were formed by environmental considerations and single and competitive energy markets across EU. The commission published Green Paper in order to provide competitiveness and security of energy supply and protection of environment in 2000. According to Green Paper, Intelligent Energy for Europe programme which had a budget of 200 million euro for 3 years put in practice from 2003 to 2006. For these purposes European Community has designed some sub programmes: (EUROPA, 2006)

ALTERNER II: This programme deals with improving energy efficiency and promotion of renewable energy sources such as solar energy and wind energy.

SAVE II: It concerns with encouragement of the rational and efficient use of energy resources.

COOPENER: It aims to support initiatives for the promotion of renewable energy and energy efficiency in developing countries.

STEER: The function of Steer is supporting initiatives relating to the energy aspects of transport and fuel diversification by using renewable energy sources.

On 25 April 2005, Intelligent Energy for Europe Programme is extended until 2013. The extended programme includes new sub programmes and the concept of competition.

SURE: It is a specific programme of actions in the nuclear sector and it is a component of the global "Energy Framework Programme".

INOGATE: It is an international cooperation programme related to transportation of petroleum and gas.

CONCERTO: It aims to reduce energy consumption and increase the usage of renewable energy sources.

Furthermore, Trans European Networks in Energy (TEN-E) which was adopted in 2001 has an important role for European Common Energy Policies. With the help of TEN-E, European Community plans on to improve security of energy supply and contribute to the development of domestic energy market.

2.2. ENERGY POLICIES OF TURKEY IN THE ACCESSION PROCESS TO THE EU

Turkey is dependent on imported energy, and this is especially true for crude oil and natural gas. Although Turkey has limited oil and natural gas resources, almost half of the energy consumption of Turkey consists of oil. On the other hand, Turkey has considerable renewable resources such as wind, solar and hydro energy resources. In order to prevent or reduce the dependency on other countries, Turkey has to diversify energy resources. From this point of view, Turkey's adjustment process of EU's energy policies is very important for increasing diversification of sources of energy supply and also improving efficiency. According to Turkish National Programme (2003), Turkey stipulated to accord EU's internal energy market and systematic policies fully.

The map is showing EU's main origin of primary energy imports. As can be seen, Turkey has an important role to play in the EU's security of supply since it is a transit country for oil and gas from the Caspian Sea, the Black Sea and Central Asia. What is more, the construction of the Blue Stream gas pipeline to bring natural gas from Russia to Turkey is continuing. In addition to these, Greece and Turkey signed "Turkey and Greece Natural Gas Pipeline" agreement. This project supported by EU-TEN fund.

With regard to EU's 2006 Report on Turkey, Turkey took steps to further diversify its supply resources and to strengthen its role as a transit country for the transportation of oil and gas by the help of the applying new legislations.

3. MODEL AND EMPIRICAL FINDINGS

Method

The model used to calculate the effect on industrial prices of a change in energy prices is static, open Leontief I/O model. Following Duchin and Steenge (2007) and Aydoğuş (1999), we will assume that, just like labor and capital, energy is a basic input and energy price is exogenous to the industrial price formation. Under this assumption, we will calculate the effect on the equilibrium industrial prices of a unit (or 100 percent) increase in energy prices by using static-open Leontief model's price formation equation:

$$\mathbf{\Delta P' = f'(I - A)^{-1}}$$

Where,

- **A** is the direct input coefficients matrix whose elements are direct input coefficients in value terms ($a_{ij} = X_{ij}/X_j$ for i, j = 1, …, n),
- **f'** is the row vector of energy intensities whose diagonal elements are direct energy coefficients in value terms ($f_j = F_{ij}/X_j$, for j = 1, …, n)
- **ΔP'** is the row vector of increases in equilibrium industrial prices.

The analysis is comparative-static in nature, simply because while the prices of all other basic inputs (e.g., wage rate) and technology are assumed to remain constant, a unit increase in energy prices is allowed.

Once the industrial price increases resulting from a unit increase in energy prices (or doubling of energy prices) is calculated, the increase in general price level can be easily calculated as a weighted average of increases in equilibrium industrial prices:

$$e = \Sigma_j \alpha_j \Delta p_j$$

Where, e is increase in general price level and α_j is the weight of the industry in total consumption expenditure, measured as the relative share of industries in total consumption expenditure ($\alpha_j = C_j/C$ for j = 1, …, n and $\Sigma_j \alpha_j = 1$) or as the relative share of industries in total output ($\alpha_j = X_j/X$ for j = 1, …, n and $\Sigma_j \alpha_j = 1$). Note that the former may be interpreted as the consumers' inflation and the latter as the producers' inflation in broad terms.

Data

Data for empirical calculations are from individual countries' most recent Input-output Tables. Input-output tables for Germany, the Netherlands, and Hungary are for the year 2000, whereas the table for Portugal belongs for the year 1999 and the I/O table of Turkey is for the year 1998. European Union countries have a standard input-output table that contains 59 sectors. Turkey's input-output table for 1998, on the other hand, contains 97 sectors. All the

tables are product by product symmetric Input Output Tables. The data used in this study came from Eurostat and Turkish Statistical Institute. All the five I/O tables are aggregated to 16 sectors. (aggregation key is provided at the Appendix Table 1). Energy sector includes coal, lignite, peat, crude petroleum, natural gas, uranium and thorium ores.

Empirical Findings

Table 2 features the direct energy coefficients by sectors for the five countries analyzed in this study. In all the five countries, the most energy intensive sector is by far Petroleum Refining industry. Energy's relative share in total cost of production amounts more than three fourth in the Netherlands and Portugal, almost two third in Germany, and less than one fourth in Turkey. As cone can expect, Electricity Generating industry is also energy intensive, except for Portugal with a direct coefficient of only 0.05.

Table 2 - Direct Energy Input Coefficients

	Germany	Netherlands	Portugal	Hungary	Turkey
Agriculture	0.00231	0.00005	0.00005	0.00081	0.00003
Energy	0.08023	0.05182	0.00000	0.10911	0.00013
Mining	0.00670	0.01248	0.00000	0.00132	0.00027
Food and Beverages	0.00339	0.00297	0.00000	0.00008	0.00811
Textile	0.00297	0.00173	0.00000	0.00034	0.00039
Wood	0.00096	0.00000	0.00000	0.00010	0.00078
Pulp and Publication	0.00500	0.00453	0.00000	0.00001	0.00070
Refining Petroleum	0.65379	0.75733	0.76456	0.53984	0.24843
Chemical Products	0.00800	0.04911	0.00000	0.02609	0.00610
Plastic Products	0.00193	0.00052	0.00000	0.00001	0.00077
Other Non Metallic	0.01693	0.01260	0.00314	0.01768	0.02630
Basic Metals	0.01159	0.01095	0.01734	0.00181	0.02775
Machinery	0.00092	0.00031	0.00000	0.00014	0.00047
Electricity	0.08018	0.25092	0.05236	0.33676	0.20148
Construction	0.00015	0.00008	0.00000	0.00002	0.00001
Services	0.00068	0.00007	0.00000	0.00023	0.00067

Source: Authors' calculation.

Table 3 shows the increases in equilibrium industrial prices as a result of a doubling of energy prices for the five countries. In Germany, highest price increase is in Petroleum Refining Industry (87.233 percent), followed by Electricity Generating industry (11.5 percent), Energy Sector (11 percent), Basic Metals Industry (8.4 percent), and Chemicals

Industry (6.9 percent). Price increases in other industries are below 5 percent. Services, Construction, and Machinery industries are least sensitive sectors to increases in energy prices.

Table 3 – Increases in Equilibrium Industrial Prices (%)

Industry	*Germany*	*The Netherlands*	*Portugal*	*Hungary*	*Turkey*
Agriculture	0.03221	0.04951	0.02613	0.07585	0.01178
Energy	0.11006	0.06017	0.28529	0.20908	0.02284
Mining	0.03043	0.09047	0.05122	0.09763	0.02654
Food and Beverages	0.02577	0.04023	0.01871	0.07075	0.02546
Textile	0.02758	0.05136	0.01954	0.05564	0.02136
Wood	0.01948	0.02798	0.01980	0.06668	0.01967
Pulp and Publication	0.02172	0.03288	0.02314	0.05629	0.02334
Refining Petroleum	0.87233	0.88322	1.05208	0.67909	0.26112
Chemical Products	0.06865	0.21356	0.06725	0.19729	0.04072
Plastic Products	0.03076	0.08709	0.03681	0.11144	0.02864
Other Non Metallic	0.04369	0.05833	0.02921	0.11296	0.06224
Basic Metals	0.08366	0.06127	0.05145	0.14932	0.09008
Machinery	0.02036	0.02997	0.02376	0.06195	0.02994
Electricity	0.11501	0.37995	0.14712	0.50435	0.22035
Construction	0.01949	0.02522	0.03320	0.05209	0.02870
Services	0.01126	0.02067	0.01717	0.03909	0.01794

Source: Authors' calculation.

In the Netherlands the most sensitive industry is Petroleum Refining (88.3 percent), followed by Electricity Generating (38 percent), Chemicals (21.4 percent), and Mining and Quarrying Industry (6 percent).

Results for Portugal are rather different in that, aside from a very high price increase in Petroleum Refining Industry (105.2 percent), price increases are also very high in Energy (28.5 percent) and Electricity Generating (14.7 percent) industries.

Hungary is unique in that in almost all industries significant price increases occur: Petroleum Refining (67.9 percent), Electricity Generating (50.4 percent), Energy (20.9 percent), Chemicals (19.7 percent), Basic Metals (14.9 percent); and even Agriculture (7.6 percent) and Services (3.9 percent) sectors are sensitive to energy price increases.

In Turkey, highest price increase is in Petroleum Refining industry (26.1 percent), which is relatively low compared to 4 EU member countries. In Electricity Generating Industry calculated price increase is 22 percent and price increases in all the remaining 14 industries are below 10 percent.

Increases in the general price levels following a once and for all doubling of energy prices are presented in Table 4. Hungary is the most vulnerable economy to increases in energy prices with a 8.65 percent increase in producers' prices and 7.67 percent increase in consumer's prices, followed by the Netherlands (6.25 percent producers' and 4.14 percent consumers' inflation). Germany, on the other hand, is the least sensitive economy to energy price increases with a 2.8 percent producers' and 2.47 percent consumers' price inflation. Inflation figures for Turkey and Portugal are very similar and slightly above the Germany's figures.

Table 4 – Increases in General Price Levels (%)

	Germany	***The Netherlands***	***Portugal***	***Hungary***	***Turkey***	***Mean***
Consumers' Inflation	0.02465	0.04135	0.02820	0.07671	0.02663	0.03951
Producers' Inflation	0.02804	0.06354	0.03576	0.08653	0.03386	0.04955

Source: Authors' calculation.

CONCLUSION

Static-open Leontief model's equilibrium price system can be used to calculate the effects on industrial prices and general price level of an hypothetical once-and for all energy (coal, lignite, peat, crude petroleum, uranium, and thorium) price increases. Since energy is a vital input, changes in energy prices (or more generally costs) are expected to cause a chain of cost and hence price increases in all industries. Given the technology, direct energy input coefficients (energy intensities), and basic input coefficients, Leotief inverse matrix can be used to trace out the total (direct and indirect) cost-price increases in industrial prices.

Our empirical results for the 4 EU member countries (Germany, the Netherlands, Portugal, and Hungary) and a candidate country (Turkey) suggest that energy (crude petroleum, natural gas, etc.) price increases indeed causes direct and indirect cost-price increases in all industries. However, calculated cost-price increases in the majority of the industries are rather smaller than one can expect in all countries but Hungary. Inflationary effects of the energy price increases are also small. Inflationary effect of a doubling (100 percent increase is stipulated for pedagogical purposes) of energy prices ultimately causes, on

the average, less than 5 percent in producers' prices (ranging between 2.47 and 7.67 percent among countries) and less than 4 percent in the consumers' prices (ranging between 2.8 and 8.65 percent among countries).

One must be very careful to derive unqualified conclusions from the empirical results. The methodology employed has certain drawbacks. First of all, the results are sensitive to the degree of aggregation. A more disaggregated (or aggregated) model may give different results. Second, energy prices (especially oil and natural gas prices) in 1998 and 2000 were at historically low levels which is a very significant factor in explaining low inflationary effects we found in this study. Finally, let's note that, in our calculations, energy sector is retained in the inverse matrix, which means indirect cost-price increases resulting from a chain of energy price increases in the following stages are also included in violation of the "once and for all increase in energy prices" assumption and with over estimation of empirical price increases.

APPENDIX TABLES

Appendix Table 1 : Aggregation Key			
Sector no	Aggregated Sector	EU Countries' I/O Table (59 Sectors)	Turkey's I/O Table (97 Sectors)
1	Agriculture	1-3	1-7
2	Energy	4-6	8-9
3	Mining	7-8	10-12
4	Food and Beverages	9-10	13-25
5	Textile	11-13	26-32
6	Wood	14	33-34
7	Pulp and Publication	15-16	35-37
8	Refining Petroleum	17	38
9	Chemical Products	18	39-43
10	Plastic Products	19	44-45
11	Other Non Metallic	20	46-49
12	Basic Metals	21	50-52
13	Machinery	22-31	53-68
14	Electricity	32-33	69-71
15	Construction	34	72
16	Services	35-59	73-97

Appendix Table 2 – Sector Definitions for EU Countries' I/O Tables (59 sectors)

1	Products of agriculture, hunting and related services
2	Products of forestry, logging and related services
3	Fish and other fishing products; services incidental of fishing
4	Coal and lignite; peat
5	Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying
6	Uranium and thorium ores
7	Metal ores
8	Other mining and quarrying products
9	Food products and beverages
10	Tobacco products
11	Textiles
12	Wearing apparel; furs
13	Leather and leather products
14	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials
15	Pulp, paper and paper products
16	Printed matter and recorded media
17	Coke, refined petroleum products and nuclear fuels
18	Chemicals, chemical products and man-made fibres
19	Rubber and plastic products
20	Other non-metallic mineral products
21	Basic metals
22	Fabricated metal products, except machinery and equipment
23	Machinery and equipment n.e.c.
24	Office machinery and computers
25	Electrical machinery and apparatus n.e.c.
26	Radio, television and communication equipment and apparatus
27	Medical, precision and optical instruments, watches and clocks
28	Motor vehicles, trailers and semi-trailers
29	Other transport equipment
30	Furniture; other manufactured goods n.e.c.
31	Secondary raw materials
32	Electrical energy, gas, steam and hot water
33	Collected and purified water, distribution services of water
34	Construction work
35	Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel
36	Wholesale trade and commission trade services, except of motor vehicles and motorcycles
37	Retail trade services, except of motor vehicles and motorcycles; repair services of personal and household goods
38	Hotel and restaurant services
39	Land transport; transport via pipeline services
40	Water transport services
41	Air transport services
42	Supporting and auxiliary transport services; travel agency services

43	Post and telecommunication services
44	Financial intermediation services, except insurance and pension funding services
45	Insurance and pension funding services, except compulsory social security services
46	Services auxiliary to financial intermediation
47	Real estate services
48	Renting services of machinery and equipment without operator and of personal and household goods
49	Computer and related services
50	Research and development services
51	Other business services
52	Public administration and defense services; compulsory social security services
53	Education services
54	Health and social work services
55	Sewage and refuse disposal services, sanitation and similar services
56	Membership organization services n.e.c.
57	Recreational, cultural and sporting services
58	Other services
59	Private households with employed persons

Appendix Table 3 – Sector Definations for Turkey's I/O Table (97 Sectors)

01	Growing of cereals and other crops n.e.c.
02	Growing of vegetables, horticultural specialties and nursery products
03	Growing of fruit, nuts, beverage and spice crops
04	Farming of animals
05	Agricultural and animal husbandry service activities, except veterinary activities
06	Forestry, logging and related service activities
07	Fishing
08	Mining of coal and lignite
09	Extraction of crude petroleum and natural gas
10	Mining of metal ores
11	Quarrying of stone, sand and clay
12	Mining and quarrying n.e.c.
13	Production, processing and preserving of meat and meat products
14	Processing and preserving of fish and fish products
15	Processing and preserving of fruit and vegetables
16	Manufacture of vegetable and animal oils and fats
17	Manufacture of dairy products
18	Manufacture of grain mill products, starches and starch products
19	Manufacture of prepared animal feeds
20	Manufacture of bakery products
21	Manufacture of sugar
22	Manufacture of cocoa, chocolate, sugar confert.& other food pro. n.e.c.
23	Manufacture of alcoholic beverages
24	Manufacture of soft drinks; production of mineral waters
25	Manufacture of tobacco products
26	Manufacture of textiles
27	Manufacture of other textiles
28	Manufacture of knitted and crocheted fabrics and articles
29	Manufacture of wearing apparel, except fur apparel
30	Dressing and dyeing of fur; manufacture of articles of fur
31	Tanning and dressing of leather; man. of luggage, handbags, sad.& har.
32	Manufacture of footwear
33	Sawmilling and planing of wood
34	Manufacture of wood and of products of wood and cork
35	Manufacture of paper and paper products
36	Publishing
37	Printing and service activities related to printing
38	Manufacture of coke, refined petroleum products
39	Manufacture of basic chemicals, plastics & synthetics rubber
40	Manufacture of fertilizers and nitrogen compounds
41	Manufacture of pesticides, other agro-chemicals and paints, varnishes
42	Manufacture of pharmaceuticals, medicinal chemicals &botanical prod.
43	Manufacture of cleaning materials, cosmetics & man-made fibers
44	Manufacture of rubber products
45	Manufacture of plastic products
46	Manufacture of glass and glass products
47	Manufacture of ceramic products
48	Manufacture of cement, lime and plaster related articles these items
49	Cutting and finishing of stone and man. of non-metallic mineral pro. n.e.c.
50	Manufacture of basic iron and steel
51	Manufacture of basic precious and non-ferrous metals

52	Casting of metals
53	Manufacture of fabricated metal products, tanks, reservoirs &steam generators
54	Manufacture of other fabricated metal products; metal working service activities
55	Manufacture of general purpose machinery
56	Manufacture of special purpose machinery
57	Manufacture of domestic appliances n.e.c.
58	Manufacture of office, accounting and computing machinery
59	Manufacture of electrical machinery and apparatus n.e.c.
60	Manufacture of radio, television and communication equipment and apparatus
61	Manufacture of medical, precision and optical instruments, watches and clocks
62	Manufacture of motor vehicles, trailers and semi-trailers
63	Building and repairing of ships, pleasure and sporting boats
64	Manufacture of railway and tramway locomotives and rolling stock
65	Manufacture of aircraft and spacecraft
66	Manufacture of transport equipment n.e.c.
67	Manufacture of furniture
68	Manufacturing n.e.c.
69	Production, collection and distribution of electricity
70	Manufacture of gas; distribution of gaseous fuels through mains
71	Collection, purification and distribution of water
72	Construction
73	Sale, maintenance and repair of motor vehicles, motorcycles; retail sale of fuel
74	Wholesale trade and commission trade, except of motor vehicles and motorcycles
75	Retail trade, except of motor vehicles and motorcycles;
76	Hotels; camping sites and other provision of short-stay accommodation
77	Restaurants, bars and canteens
78	Transport via railways
79	Land transport; transport via pipelines
80	Water transport
81	Air transport
82	Supporting and auxiliary transport activities; activities of travel agencies
83	Post and telecommunications
84	Financial intermediation, except insurance and pension funding
85	Insurance and pension funding, except compulsory social security
86	Real estate activities
87	Renting of machinery and equip. without operator and of personal and hh. goods
88	Computer and related activities
89	Research and development
90	Other business activities
91	Education
92	Health and social work
93	Activities of membership organizations n.e.c auxiliary to financial intermediation
94	Recreational, cultural and sporting activities
95	Other service activities
96	Public administration and defense; compulsory social security
97	Ownership of dwelling

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